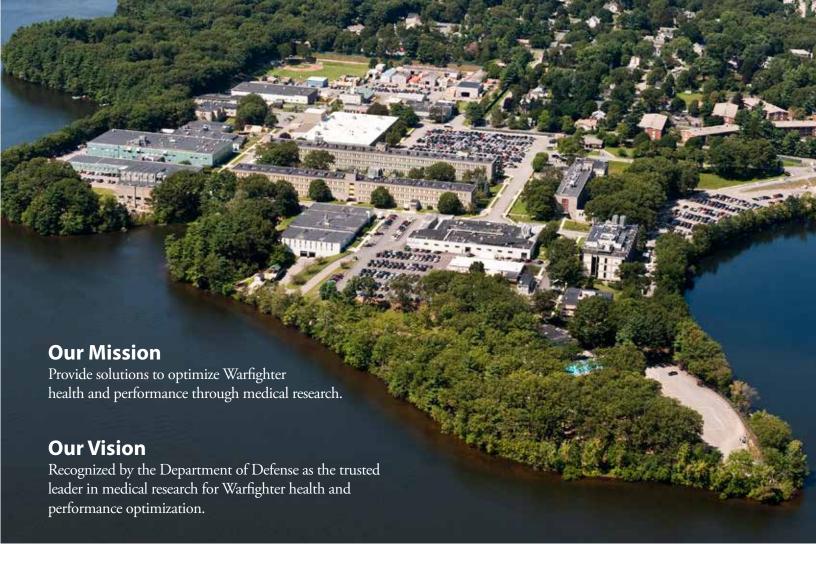
USARIEM Warfighter Health & Performance



USARIEM is co-located at the Soldier Systems Center in Natick, Massachusetts. A short distance from Boston, the institute offers researchers its own unique facilities and is in close proximity to many of the finest universities.

- Hypobaric Chambers (9,000m, -15°C to 40°C)
- Environmental Chambers (-10°C to 50°C)
- Water Immersion Laboratory (5°C to 45°C)
- Biomechanical Laboratory
- Human Exercise Physiology Laboratories
- Laser and Flow Cytometer Laboratory
- Pikes Peak Research Facility (4,300m)
- USARIEM / Womack Medical Research Facility
- Metabolic Kitchen
- Body Composition Laboratory

History

Recognizing the importance of environmental and operational contingencies for the health, performance and effectiveness of troops in training or combat, USARIEM was activated on July 1, 1961 in Natick, Massachusetts as a research laboratory under the U.S. Army Medical Research & Development Command (now called the U.S. Army Medical Research & Materiel Command).

The Institute was created from a composite of elements associated with a number of outstanding federal and academic laboratories,

including the Harvard Fatigue Laboratory in Cambridge, Massachusetts, the Armored Medical Research Laboratory at Fort Knox, Kentucky, the Climatic Research Laboratory in Lawrence, Massachusetts and the Quartermaster's Environmental Protection Research Division and Earth Sciences Division at Natick.

Key Products

Performance Optimization Doctrine: USARIEM produces training policy and guidelines that provide recommendations to enhance Warfighter capabilities and reduce health risks.

Preventive Medicine & Planning Doctrine: USARIEM produces preventive medicine guidelines to minimize Warfighter injuries and lost duty time and medical costs.

Materiel Development Support: USARIEM recommends product improvements for clothing, equipment, nutrition and pharmaceuticals by providing design specifications to improve individual Warfighter equipment and rations.

Monitoring Strategies & Predictive Algorithms: USARIEM has developed strategies for personal status monitoring and a variety of algorithms to prevent and detect Warfighter performance decrements.

Health Hazard Assessment: USARIEM coordinates with the Center for Health Promotion and Preventive Medicine (CHPPM) for thermal and hypoxic conditions.

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Making a difference

Army surgeon general visits USARIEM

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

During a Sept. 23 visit to the U.S. Army Research Institute of Environmental Medicine, the Army surgeon general and commanding general of the U.S. Army Medical Command learned more about the important work being done here for service members.

Lt. Gen. Patricia D. Horoho toured the U.S. Army Research Institute of Environmental Medicine, or USARIEM, which is situated at Natick Soldier Systems Center, and received briefings on such subjects as biophysics and biomedical modeling, thermal and mountain medicine, military performance, military nutrition, and the development of genderneutral physical standards for Army Military Occupational Specialties, or MOSs.

"I think what impressed me the most was the level of dedicated scientists, researchers, those that can connect the expertise of what needs to be done in our military with the science behind it so that the right decisions are being made," Horoho said.

Horoho came away impressed by "just how pervasive they are in so many different areas that are tied to our strategic objectives — whether it is health, whether it's injury prevention, and the performance of our Soldiers, Sailors, Airmen and Marines — so we are constantly looking at improving the performance of those that are willing to give so much to our nation."

Horoho also spoke about her personal experience with the new female body armor, developed in a collaborative effort between Natick Soldier Research, Development and Engineering Center and Program Executive Office Soldier.

"When I first put it on, the initial impression was this is what security feels like," Horoho recalled. "And then I had the honor of being able to deploy with it in Afghanistan. It was easy to put on, to take off, and more important, it gives you the confidence that you need in an environment that is hostile."

At a time when the body armor is being widely issued to female Soldiers, Horoho talked about how its effectiveness should be evaluated.

"What I think we need to do now, because there was so much research and time and expertise that was put into the (improved outer tactical vest), is we need to have it deployed, really utilized, get the feedback from our females, and then make those adjustments, as needed," Horoho said. "But from an initial use of it? It's pretty much on the mark. So I think it's going to be some small changes, if changes occur with it."

Finally, Horoho addressed Natick's importance during a time of conflict for this nation.

"You know, when we look at the success that we've had on the battlefield for the last 12 years, I think it's because we've had questions that were asked 15 to 20 years ago (and) research that was done here that drove the changes in personal protective equipment or practices," Horoho said. "We need to continue to focus on that to ensure that we're ready for the next 10 to 15 years in the future. But I could not be more proud of the team that's here, the hard work and the expertise that we have. We're making a difference."





Army Chief of Staff Gen. Raymond T. Odierno visited the U.S. Army Research Institute of Environmental Medicine at the Natick Soldier Systems Center on Nov. 18 to tour its facilities and learn more about the research that USARIEM's Military Performance Division is conducting with the U.S. Army Training and Doctrine Command as part of Soldier 2020.

At the Center for Military Biomechanics Research, USARIEM researchers told Odierno of their work to develop gender- and age-neutral physical performance standards and predictive performance tests for several combat-related military occupational specialties.

"What they do here is an incredibly important mission to the Army, as they continue to work what I consider to be our center of gravity, which is helping our Soldiers do their job,"

Odierno said. "The

keystone of our

Army has

always been our Soldiers, and that will never change. We're focused on how to help Soldiers become more capable and efficient, so the work done here is very important because it supports that."

Recently, the Army has turned to the US-ARIEM to objectively determine the physical demands of these jobs in order to facilitate the incorporation of women into these new positions.

Called the "Physical Demands Study," these studies will be used to determine the physical requirements that are necessary to perform all combat type jobs including infantry, armor, artillery and engineering.

First Odierno met the team of USARIEM investigators which includes exercise physiologists, biomechanists, a physician assistant, an occupational therapist and psychologists, all of whom share their skills across

disciplines to accomplish this massive research effort. He was then walked through the multi-phase project. The first stop with the Military Performance Division Team highlighted the initial phase in which researchers determined what the physical demands of the tasks are for each MOS.

Next, Odierno was shown Soldiers performing load carriage to illustrate USARIEM's scientific methodology to record physiological data from Soldiers performing such tasks.

Finally Odierno was walked through a demonstration of the final phase, which will be to test Soldiers performing the task simulations and predictive tests to determine the relationships between the two sets of tests.

"I wanted to come up here and have the opportunity to thank the incredible Department of the Army civilians, and our contractors and all that help to do the hard work that's done here in Natick," Odierno said. "They are a critical part of the joint force, because much of what they do here not only impacts the Army, but other services as well."

Army Chief of Staff Visits USARIEIVI

By Kelly Sullivan, USARIEM Public Affairs / Natick, Mass



Kennedy visits Natick as part of **STEM** tour

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

As part of his "STEM Tour of Massachusetts," Rep. Joseph P. Kennedy III visited Natick Soldier Systems Center, Aug. 14.

Kennedy, who represents the 4th Congressional District of Massachusetts, met Gains in Engineering, Mathematics and Sciences, or GEMS, students, and then was given an overview about science, technology, engineering and mathematics, or STEM.

Kennedy also received an overview on NSSC, visited the Porter STEM Laboratory GEMS demonstrations, and was briefed on laser eye protection and the Thermal Test Facility.

Brig. Gen. Daniel P. Hughes, NSSC senior commander, told Kennedy that even as Natick works to develop the next generation of scientists and engineers, budgetary

uncertainty makes it difficult to hang onto the talented workforce it has now.

"We're going to lose a lot of great folks that we've spent a lot of years developing," Hughes said.

The congressman was making his first visit to Natick since taking office in January. Honorary chair of Massachusetts Governor Deval Patrick's STEM Advisory Council, Kennedy is a member of the House Committee on Science and Technology and a member of the Congressional STEM Caucus.

Kennedy was accompanied on the tour by members of his congressional staff and by Massachusetts Secretary of Education Matthew Malone and Adam Freudberg, senior policy advisor and executive director of the Military Task Force in the governor's office.



GEMS mentor demonstrates a science experiment to Ren. Kennedy.

After the tour, Kennedy and Malone spoke to and took questions from the local news media.

"It was an absolutely spectacular afternoon to get a sense of some of the capabilities of what happens here and to learn a bit about how important the research and development component is to protecting our troops," said Kennedy, adding how he saw "how the students here are actually becoming teachers and actually reaching out to middle schoolers and high schoolers and getting them excited about science and igniting a passion for the type of careers and work that is going to end up saving lives in the future. So I'm absolutely honored to be able to be here today."

Malone, himself a Marine Corps combat veteran, said that the NSSC STEM approach could be replicated across Massachusetts.

"They've gone out of their way to invite public school kids onto their base during the summer to do a lot of hands-on work," Malone said. "They figured out a methodology that makes sense.

"I think we've got a beachhead," Malone continued. "This is marathon work, and it takes a long time, but by having a beachhead such as this, we can continue to move forward."

Kennedy was asked about the impacts of sequestration and recent employee furloughs on the Natick workforce.

"That's not talent that you can easily attract back," Kennedy said. "Sequestration is something that I've been outspoken about from even before I took office. There's a smart way to confront those fiscal challenges and there's a dumb way to do it, and I think the sequester certainly is not the best approach."

Kennedy said he would "try to take some of the lessons, the stories that we heard today, back down to Washington to my colleagues and let them know how important it is to find a different fix."

On Guard

Against Traumatic Brain Injuries

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

tend to be older, more experienced, and more likely to have families, but deployed members of the National Guard share something in common with their active-duty brothers and sisters — the likelihood of suffering from traumatic brain injuries.

Like other U.S. service members, Guard members take the Automated Neuropsychological Assessment Metrics, or ANAM, test before deployments.

"It provides a baseline of sorts," said Dr. Kristin Heaton, a neuropsychologist at the U.S. Army Research Institute of Environmental Medicine at the Natick Soldier System Center. "Then if there's an incident in theater — an injury or a blast exposure or something like that — we can look for changes in these scores as markers of possible injury."

What's missing is a reference data set specific to the National Guard so that its members may be compared to their peers. Heaton and other USARIEM researchers aim to correct that by collecting data from a total of 3,000 Guard members from eight states, three different age groups, males and females, in combat support and combat arms units.

"We've been in active data collection now for a while," said Heaton, adding that the process will be complete in December. "We're aiming for a diverse geographic representation. Having a meaningful, representative data set like this could be really helpful for interpreting scores, both before and after injuries."

Why is it important to differentiate the National Guard from other service groups when it comes to traumatic brain injury, known as TBI?

"Being able to better understand [National Guard service members'] unique situation and how deployments have affected them, both in the positive and perhaps not-so-positive ways, is an important area of research that really hasn't been well developed."

— Kristin Heaton

"In many respects, they represent a different demographic of Soldier," Heaton said. "For example, they tend to be older, have families and children, and have dual careers. There is some evidence in the literature that they may respond to deployments, both during and after, somewhat differently than their active-duty counterparts, all of which may impact not just the Soldier, but his or her family, as well."

Heaton said that in the past, most TBI research had been on active-duty service members. The National Guard recently has become more of a focus.

"Being able to better understand [National Guard service members'] unique situation and how deployments have affected them, both in the positive and perhaps not-so-positive ways, is an important area of research that really hasn't been well developed," Heaton explained.

Heaton said she hopes to publish a study containing the results soon after data collection ends. Her team will also provi de the resulting data to the National Guard Bureau and the participating states directly.

"They've been extremely supportive, and I think they definitely understand the relevance of what we're doing and why," Heaton said. "We really do want to be able to get data into their hands that they can use and that would be meaningful and relevant to them, as quickly as we can."

Just what the data will show, Heaton can't accurately predict.

"They're going to perform probably very similar to the rest of the population," Heaton said. "But we do feel, given that they are a unique cohort within the military, the reference data would reflect their unique demographics."

Heaton pointed out that National Guard leadership has great interest in the health and welfare of their personnel.



"They're very focused on their Soldiers, not just when they have them on drill weekends, but also when they go back home and return to their civilian jobs and re-integrate to their home life situations," Heaton explained. "They're extremely interested and eager to know more and to have information that they can then use to help their Soldiers. They have been quite welcoming of this work."

This is the latest in an impressive number of TBI studies done by Heaton and other USARIEM researchers.

"Much of our work to date has been focused on developing and validating measures of cognitive performance as ways of assessing traumatic brain injury — concussion, in particular," said Heaton, who added that the goal is "to provide more efficient, more effective and relatively fieldable tools for use by leadership, by medical command, to screen for concussion."

According to Heaton, TBI research is far ahead of where it stood several years ago. She said she wants to see that momentum continue.

"Traumatic brain injuries don't go away just because the war ends," Heaton said. "The effects of these injuries are going to remain with the Soldiers who have sustained them, and a good number of head injuries and concussions occur during training and during off-duty activities. So this is going to be an enduring problem.

It's no secret that Soldiers must prevail in all kinds of terrain and climates to complete missions. Afghanistan, for example, boasts mountains with elevations higher than 24,000 feet.

Many Soldiers who have deployed to high altitudes without the proper time to adjust have learned the hard way that they are probably going to get sick.

"Rapid ascents without sufficient time to adapt to altitude can lead to acute mountain sickness or AMS," said Dr. Stephen Muza, acting division chief for the U.S. Army Research Institute of Environmental Medicine's Thermal and Mountain Medicine Division. "This condition, marked by nausea, fatigue, headache and gastrointestinal distress, can really throw a wedge into a mission when not planned for."

Abrupt exposure to high altitude negatively affects mental and physical performance and overall health because it lowers the oxygen supply to the body's tissues for a significant

amount of time. This condition, known as hypoxia, is what leads to altitude sickness.

"You also see a performance decrement at altitude," said Muza. "A Soldier may not be able to carry as heavy a load as they are used to or even march at speed."

This summer, like many summers before, researchers from USARIEM's Thermal and Mountain Medicine Division traveled to Pikes Peak in Colorado to study the physiological effects of AMS.

"Soldiers have to perform in the mountains," Muza said. "We know lack of oxygen impairs health and performance. Currently, we are developing a tool that will give commanders a validated predictive model that accurately tells them at what point a Soldier may feel the effects of AMS and the likely severity of the symptoms."

Annually, researchers from TMMD make the trek to perform research at Pikes Peak because it allows them to validate the studies they conduct in the altitude chamber in Natick, Mass., while replicating a forward operating base environment similar to ones in Afghanistan. Also, Pikes Peak has what Muza calls the "ideal research elevation" of 14,000 feet, allowing for significant impairment without making people dangerously sick.

This year's study concluded a two-year study. Researchers from USARIEM collected data on 70 men and women who were exposed to four different altitudes at different activity levels to validate their previously published predictive model of AMS, which suggested that altitude, time at altitude, gender and physical activity level are significant predictors of AMS.

Peak Performance continued

Army developing tool to reduce altitude sickness in deployed Soldiers

By Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.

"If a commander has a small unit of 12 Soldiers with specialized skills and potentially two can get sick, that really impacts their mission. With this tool, he or she can think ahead to bring an extra person or allow for more time for Soldiers to acclimatize to the altitude. Essentially, it tells them the risk and also provides them with ways to mitigate that risk."

> Dr. Beth Beidleman. research physiologist, USARIEM

Peak Performance continued

Researchers were also there to collect data to develop an altitude acclimatization model as part of the Altitude Readiness Management System, or ARMS, being developed. This system will contain three models: the validated AMS model, the altitude acclimatization model and a physical performance model.

"USARIEM has the world's largest mountain medicine database," said Dr. Beth Beidleman, a research physiologist for TMMD and the primary investigator for this study. "By using the wealth of historical data combined with the studies we have done at Pikes Peak, we have been able to pool information and create this important system."

Prior to this, there was no test that could predict an individual's likelihood of getting altitude sickness. So the researchers at

TMMD came up with the idea to create a model that would significantly help planners and commanders when they are planning missions.

provides actual ways to reduce the severity and potentially avoid the affects of AMS altogether.

The first AMS model will allow commanders to identify the likely probability and severity of Soldiers experiencing AMS based on the mission requirements. If the risk and severity are too high, the altitude-acclimatization model will then enable commanders to mitigate the risk of AMS by developing an altitude-acclimatization prescription to avoid the harmful effects.

"This model allows commanders to mitigate the impact of altitude exposure," Beidleman said. "It not only predicts whether a Soldier would get ill at certain altitudes, it gives a prescription for exposure. This tool can prescribe, for example, that if (Soldiers spend) two days at 8,000 feet before they go to their final altitude of 14,000 feet, the likelihood and severity of AMS would be drastically reduced."

When this patent-pending technology debuts, the goal is to have produced a stand-





U.S. Army Training and Doctrine Command, or TRADOC, has partnered with USARIEM to conduct the Physical Demands Study. Here Dr. Joseph Seay from USARIEM observes tests that will be used to determine the physical requirements necessary to perform all combat-type jobs, including infantry, armor, artillery and engineering.

USARIEM researchers add scientific rigor to MOS study

By Ms. Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.

The U.S. Army Research Institute of Environmental Medicine is working to objectively determine the physical demands of the military occupational specialties.

U.S. Army Training and Doctrine Command, or TRADOC, has partnered with USARIEM to conduct the Physical Demands Study. The study will be used to determine the physical requirements necessary to perform all combat-type jobs, including infantry, armor, artillery and engineering.

Edward Zambraski, division chief of US-ARIEM's Military Performance Division, is leading the research teams. This team of USARIEM investigators includes exercise physiologists, biomechanists, a physician assistant, an occupational therapist and psychologists, all of whom will share their skills across disciplines to accomplish this massive research effort.

Zambraski said his team's mission is to produce scientifically validated research that leads to accession standards.

"Ultimately, our goal is to develop a battery of predictive tests that are field expedient to best match an individual's physical capabilities to the demands of specific MOS tasks," Zambraski said. "The key will be to come up with predictive physical performance tests to determine whether an individual, regardless of gender, will be able to physically perform the job in that military occupational specialty."

The project is expected to take three years and will involve hundreds of Soldiers as volunteers.

Marilyn Sharp, the principal investigator for this study, said USARIEM's researchers will independently and scientifically evaluate and validate all data within the study.

"The first thing we did was a job task analysis to determine what the physical demands of the tasks are for each MOS that we studied," Sharp said. "Once those critical physically demanding tasks are identified, such as loading a Howitzer, the next step is to develop accurate task simulations so they resemble the MOS tasks."

Sharp said USARIEM has assisted TRADOC to identify these critical physically demanding MOS specific tasks, and USARIEM is now applying scientific rigor and methodology to record physiological data from Soldiers performing the tasks.

Measurements of heart rate, breathing rate and oxygen consumed (or the energy required during the task) are being made before and during the execution of these physical tasks.

This is all leading to the final phase, which will be to test Soldiers performing the task simulations and predictive tests to determine the relationships between the two sets of tests. A Soldier's performance on these two sets of tests will be used to develop an equation that can predict a Soldier's likelihood of successfully performing the critical tasks in a given MOS.

"This is a science-based approach that determines the key physical tasks required to do a particular job and the tests by which we can measure someone's physical capacity to perform those tasks," said Gen. Robert W. Cone, commanding general of TRADOC. "Our fundamental goal is to place everyone on a path toward a meaningful career based on individual merit, simultaneously ensuring the highest levels of combat effectiveness."

USARIEM battles Acute Mountain Sickness

The isible energy

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

When they deploy rapidly to the mountainous regions of Afghanistan, U.S. Soldiers confront more than the enemy.

At heights exceeding 8,200 feet, they must worry about the effects of altitude on their mental performance and about their susceptibilities to Acute Mountain Sickness, or AMS. As acting chief of the Thermal and Mountain Medicine Division at the U.S. Army Research Institute of Environmental Medicine, Natick Soldier Systems Center, Stephen R. Muza, Ph.D., devotes a great deal of time to studying those problems.

"We need to know the actual, physiological basis for the development of these altitude illnesses," said Muza, "and specifically in this case, Acute Mountain Sickness, in order to target new pharmaceutical products."

Working toward that goal, Muza and his colleagues at USARIEM are collaborating with the Neural Systems Group, Massachusetts General Hospital, Harvard Medical School on "Neuroimaging of Acute Mountain Sickness," a research study sponsored by the Department of Defense Telemedicine and Advanced Technology Research Center. The study is using near-infrared neuroimaging, or NIN, to non-invasively measure changes in the brains of test subjects at sea level and 14,500 feet while doing cognitive tests and either light or heavy exercise.

Neuroscientist Gary Strangman, Ph.D., of MGH has been bringing his NIN equipment to Natick, where it is used on subjects in USARIEM's hypobaric chamber, which can simulate altitudes up to 30,000 feet. The

NIN is a portable alternative to magnetic resonance imaging, or MRI.

"He can specifically look at what's going on in this brain tissue between the transmitter and the receiver," said Muza of Strangman. "We're not looking at the whole brain, but we're looking at the cortex, where most of the neurons are found. That's where really where all of the action is."

The collaborative study is focusing on 36 healthy civilian subjects from the Boston metro area, who have baseline measurements done at MGH and then spend two eighthour sessions each in USARIEM's chamber. Light is beamed through their brain tissues and then analyzed for changes in blood volume, oxygenation, and fluid distribution.

"He was looking for an opportunity to use his equipment," said Muza of Strangman. "I was looking for an opportunity to use cutting-edge (equipment), basically what nobody else has in this world — new portable imaging devices — to study the changes in the brain at altitude in our hypobaric chamber, because you cannot bring an MRI (in there)."

As Muza pointed out, Soldiers' thought processes slow at altitude. So Strangman designed cognitive tests on a computer screen to measure subjects.

"We want to cause the brain to have to work, and to make the brain work, we do cognitive tasks," said Muza, "things that are very comparable to what a Soldier does."

Muza and Strangman also want to know what the brain is doing when a subject is

experiencing headaches, lightheadedness, nausea and other symptoms associated with AMS.

"When you get above 14,000 feet, there's better than an 80 percent chance that you'll develop some degree of severity of Acute Mountain Sickness," Muza said. "We're interested in knowing what's going on in the brain in the hours that lead up to the development of Acute Mountain Sickness."

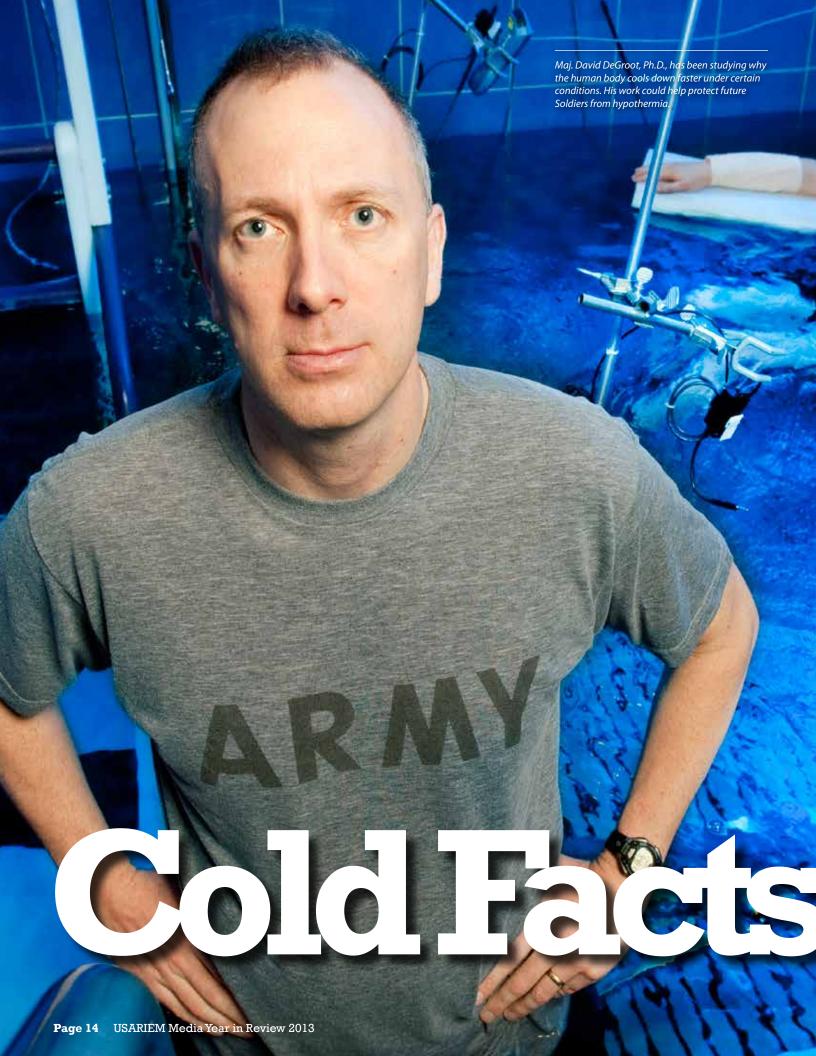
The study has been ongoing for a year and should be completed in May. The early data are encouraging.

"In the individuals reporting Acute Mountain Sickness versus those who do not report having symptoms of Acute Mountain Sickness, we see that there is a reduction in blood flow to the brain and, therefore, oxygen delivery to the brain in the individuals who are sick versus the individuals who are not sick at altitude," Muza said. "We do see, with 60 minutes of exercise, more Acute Mountain Sickness than we see with the 10 minutes of exercise. We expected that, and that's happening."

The only available pharmaceutical treatment, said Muza, improves breathing, not brain function. This study could help change that one day.

"Finding an alternative drug therapy is a long-term goal of our research program," said Muza, who added that the collaborative study has offered "the opportunity to bring what I think nobody else has in the world into our hypobaric chamber and use it to study these effects."







Army researcher studies hypothermia

Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

Maj. David DeGroot, Ph.D., went looking for the cold facts, and after years of study, he may have them.

Now the field investigation team leader for the Injury Prevention Program, Army Institute of Public Health, U.S. Army Public Health Command in Aberdeen, Md., DeGroot actually began his quest to discover why the human body cools down faster under certain circumstances when he was a research physiologist in the Thermal and Mountain Medicine Division at the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center.

DeGroot wanted to learn more about why four Soldiers died from hypothermia in 1995 during the final phase of Ranger School in hopes of developing medical techniques to help prevent such tragedies. He and his team used data collected from eight Soldier volunteers, who were fitted with microdialysis fibers, muscle temperature probes and skin temperature sensors. They were then put into the 102-degree waters of an immersion tank, followed by a trip to an environmental chamber, where the air temperature was a relatively cool 66 degrees.

"The key part of the study was using microdialysis to 'pharmoco-dissect' the mechanisms that control skin blood flow," DeGroot said. "Human skin is unique in that it is under dual neural control — there is a vasoconstrictor system, as in all mammals, that functions to reduce blood flow through the vasculature. However, humans also have an active vasodilator system in the skin, which serves to increase blood flow, which as a result increases heat transfer to the environment."

DeGroot built upon the 1999 study by US-ARIEM's John Castellani, Ph.D. Castellani was part of a team that conducted the institute's initial study at Camp Rudder on Eglin Air Force Base, Fla., soon after the deaths. Castellani's work led to adjustments to the immersion and exposure tables Rangers use to determine what amount of exposure to cold is safe.

Castellani found that exposure to cold air after exercise led to a faster rate of decline in core temperature, higher skin temperature, and higher rate of heat transfer through the skin.

"The follow-up question to John Castellani's 1999 study was, what mechanism was responsible for the increased skin heat flux and accelerated body core temperature decline that he reported when cold exposure was preceded by active heating, (such as) exercise in an immersion pool?" DeGroot said.

To answer that, DeGroot and his team used several pharmacological agents.

"By comparing the control site between the active and passive heating trials, we could demonstrate the effect of prior exercise on skin blood flow," DeGroot said. "During the passive heating trial, skin blood flow decreased 40 percent from baseline. However, during the active heating trial, it only decreased 28 percent, which is a statistically significant difference.

"These data indicate that prior exercise leads to higher skin blood flow during subsequent cold exposure. So, why?

Botox, which is typically used for cosmetic purposes, was used at one microdialysis site because it also stops vasodilation of skin blood vessels. Skin blood flow at this site decreased more than 50 percent during the cold exposure, bringing it in line with the passive heating trial.

"Based on the available data, we conclude that active vasodilation over-rode a competing vasoconstrictor signal and resulted in higher skin blood flow," DeGroot said. "Using these data, researchers might be able to develop pharmacological agents to maintain the vasoconstrictor response to cold and thereby reduce the risk of hypothermia."

With a better understanding of the human body's response to cold, researchers are a step closer to helping future Soldiers ward off hypothermia.

Calorie COULT

Army studying special operators' nutritional needs

A typical service member in garrison needs to consume about 3,250 calories a day for sustenance. Maj. Aaron Crombie, Ph.D., is in the process of estimating how much more a special operator should eat.

Crombie, who works for the Military Nutrition Division at the U.S. Army Research Institute of Environmental Medicine, or USARIEM, at Natick Soldier Systems Center, Mass., is leading a team that has been studying special operations forces at training venues around the country to discover that. Results will be used to adjust the Basic Daily Food Allowance, or BDFA, for dining facilities that serve their meals.

"We know that these guys move a lot," Crombie said. "They train a lot. Some of them are doing two-a-day workouts. They spend a lot of time in the gym, a lot of time at the ranges."

This isn't the first time USARIEM has studied special operators' needs in garrison, said Andrew Young, Ph.D., chief of the Military Nutrition Division.

"The Special Forces have long argued that their people work harder and sustain much higher rates of energy expenditure than the average Soldier when they're training in garrison and subsisting in dining facilities," Young said. "As a result, they argue that their dining facilities should be able to be provided more money per diner to provide more food and extend their operations accordingly to better

meet the nutritional requirements of these more highly active special operations units that are training in garrison."

The current USARIEM study began at the Combat Diver Qualification Course in Key West, Fla. Crombie said preliminary results indicate that service members at that venue needed 4,600 calories a day. Data from Fort Bliss, Texas, and Fort Bragg, N.C., will also be included in the study.

"Dive school is probably going to be the high end of the spectrum," Crombie said. "We should be done collecting data (by the) end of March."

According to Young, nutritional energy requirements are assessed using what's called the "doubly labeled water technique." At the beginning of testing, service members drink water enriched with natural isotopes.

"You can then measure the decline in those isotopes in the body," Young said. "Based on the rate those isotopes decline, we can actually calculate the rate of carbon dioxide loss from the body, which in turn provides an accurate estimate of the rate that the body is burning calories. We compare the caloric burn rate in the Special Forces Soldiers to data we have measured in Soldiers from other types of units.

"We get a representative sample of the Special Forces unit members who are engaged in representative activities. We track them during the course of about five to seven days of training."

Crombie said that previous studies have shown special operators burn as many as 40 percent more calories in garrison activities than other service members do. The report from the current USARIEM study should be available sometime this summer, he added.

"They're bigger guys," said Crombie of the special operators.
"They have more muscle, so that's more calories they're burning just moving around. They carry a lot of equipment."

Crombie had nothing but compliments for the study subjects and their high level of cooperation with his team.

"They've been really compliant.
They've been really interested in what we're doing," Crombie said. "It's been a good experience working with the units and working with the guys that coordinated (it), because they are really on point."



Arctic Ski Warch

Natick researchers team up with Norwegian Army to measure nutritional needs

By Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.

A group of scientists from the U.S. Army Research Institute of Environmental Medicine recently returned from a field study in which they teamed up with the Norwegian Defense Research Establishment and the Norwegian Army from the Garnisonen i Sør-Varanger in Kirkenes, Norway, to assess the physiological demands of a multi-day winter training exercise.

Norwegian soldiers and U.S. Army Research Institute of Environmental Medicine's, or USARIEM's, researchers braved whiteout conditions and intense March winter weather — sometimes with temperatures that were as low as minus 22 degrees — during the Garnisonen i Sør-Varanger's, or GSV's, three-day ski march exercise along the Norwegian-Russian border in an effort that took more than a year of collaboration and planning.

"For this study we're very interested in recovery nutrition," said Andy Young, Ph.D., division chief for USARIEM's Military Nutrition Division. "[Norwegian Defense Research Establishment] had used the ski march successfully in other studies. They suggested that we collaborate with them on this study to document and quantify the level of physiological strain during this exercise to see if it would be appropriate for future tests of prototype 'recovery rations."

Every winter, the Norwegian Army sends companies of conscripted soldiers through cold-weather military training at GSV. This training includes a multi-day winter survival course that culminates with a three-day ski march along the border between Norway and Russia.

"This was an opportunity to assess physiological stress using an actual real-world training

environment," said Stefan Pasiakos, Ph.D., a nutritional physiologist with MND. "Our objective was to characterize how physically challenging the actual training course was and how their bodies responded to the combination of extreme weather and sustained physical activity. This real-world scenario is difficult to duplicate in the laboratory."

As part of USARIEM's mission to enhance warfighter health and performance, researchers from MND are always looking for ways to assess nutrition requirements during realworld operational conditions.

"We thought this winter training event would be an ideal situation to characterize nutritional requirements of operational stress imposed by a combination of exercise while carrying heavy loads, environmental extremes and potentially inadequate food intake," Pasiakos said. "The resultant stress and potential energy imbalance are important determinants of optimal nutrient composition of combat rations for these types of missions and conditions."

When a Soldier is highly stressed and performs high levels of physical activity, he or she may not consume enough calories, because there may not be enough food or simply because they are active all day and do not stop to eat.

"This can lead to a caloric deficit, which can compromise skeletal muscle and bone health, leading to decrements in physical performance and increased injury risk," Pasiakos said. "By better understanding these sometimes unavoidable physiological consequences of military operations, we aim to identify effective nutritional countermeasures suitable for incorporation in new combat rations."



In March 2013, months of planning and coordination between USARIEM, the Norwegian Defense Research Establishment, known as FFI, and GSV paid off. Four researchers from USARIEM's MND and one from the Thermal and Mountain Medicine Division left on a two-week trip to GSV on Norway's extremely cold border with Russia.

The first few days in Norway were spent recruiting soldier-volunteers to participate in the study and to get baseline testing done. While this was happening, Norwegian soldiers were training and preparing for the ski march that was now only days away by learning how to function in teams, executing military tasks and winter-survival drills in the field.

"GSV's command was extremely supportive, allowing us ample access to their soldiers and facilities," Pasiakos said. "Thirty soldiers volunteered and we completed all preliminary



testing — biological sampling, muscle power testing, cognitive testing, diet assessment and anthropometrics — within the first two days of our trip. Our USARIEM and FFI team was exceptional; they were truly a great group to work with."

Volunteers were outfitted with physiological strain monitors and swallowed ingestible temperature pills to monitor activity and core temperature continuously during the ski march. Volunteers also consumed stable isotopes to measure energy expenditure and protein metabolism. Then Pasiakos, along with Svein Martini, a principal scientist from FFI, headed out into the cold to track their volunteers during the approximately 60-mile trek.

"These soldiers had a lot of ground to cover in a short time," Pasiakos said. "During the march, soldiers carried about 75-100 pounds on their backs. Most soldiers skied for about 12 hours during the first day. They would ski for 50 minutes and then have a 10-minute break. They would use the break to change into dry clothes and to eat something fast."

On the second day, the weather conditions worsened, with treacherous winds and blizzard-like conditions, making visibility extremely difficult. That night, the march had to be halted earlier than expected at a patrol station along the border.

The soldiers and scientists skied on, continuing military training and research data collection until the end of the march on the third day. At the end of the trip, the soldiers had to go to the range and qualify with their weapons, while the USARIEM and FFI team assembled a field laboratory at Grense Jakobsely, another border patrol station, to make

the last measurements on the volunteers and gather the last of the test samples.

The researchers then packed up and headed back to the states. Now home, Pasiakos is excited for the results of the study, hopes that preliminary data are available by early summer, and is open to the potential of future trips.

"We conducted a strong observational study; we just have to wait and see what the data tell us," Pasiakos said. "Getting a chance to work with a large group of soldiers and collect information that is valuable for the U.S. and Norwegian Army couldn't have been done in the lab. This was our chance to go out there and ask 'what's really happening?' This was a perfect opportunity to do that."

Quiet Little Tribute's

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

When he heard that some of those prevented from finishing the recent Boston Marathon would honor bombing victims by entering and completing another marathon, Maj. Owen Hill knew he could do but one thing — lace up his running shoes and join them in the tribute.

That's why Maj. Owen Hill, Ph.D., entered the 2013 Cox Sports Marathon, which will be run May 12, in Providence, R.I.

Hill, deputy chief of the Military Performance Division at the U.S. Army Research Institute of Environmental Medicine, Natick Soldier Systems Center, might not be quite ready for the distance, but that doesn't matter to him.

"I just said, 'All right, I'm running it for everybody who can't,'" Hill said. "I just pictured those individuals who lost their limbs lying in a hospital bed. What would they give to run a marathon, just run, just get out there and run and have that freedom?"

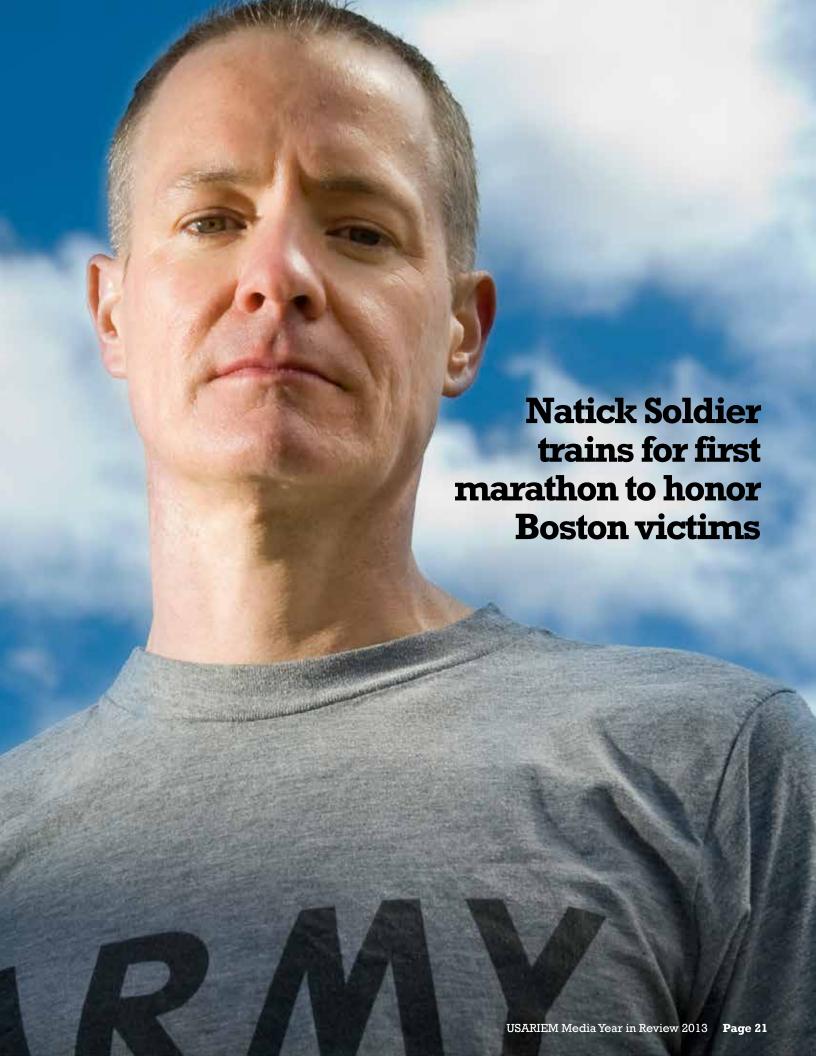
Hill also had a direct connection to this year's Boston Marathon. His girlfriend, Jesse-Lee

Lavoie, 33, a cardiology critical care nurse practitioner, had run the race in a personal-record 3 hours, 22 minutes, and finished just 45 minutes before the bombing.

Work commitments had kept Hill from attending the marathon, so when he learned of the attack, he was concerned about Lavoie's safety.

"I couldn't reach her for a good hour," Hill recalled. "Her parents couldn't reach her. That was terrifying. I knew that she had finished. I wasn't sure (if) she was in the area. It was a really difficult hour, but thank goodness, she was OK."

'Quiet Little Tribute' continued



'Quiet Little Tribute' continued

So when he read about the Mother's Day marathon in Providence, Hill had plenty of motivation to register. He figured that if he runs just a quarter-mile for each of those either killed or injured, he will cover the entire 26.2 miles.

"So I just said to myself, 'I'm doing it,' and I signed up," said Hill, "and then I realized I've got a marathon in about two weeks."

Hill had done a pair of half-marathons while deployed to Iraq in 2007, but he hadn't been training anywhere near enough lately to justify attempting his first marathon.

"I'm just an Army runner," said the 43-year-old Hill, who entered the service at 18 and is an avid rock climber. "I'm a recreational runner. On average, I try to run 20-30 miles a week."

Ironically, Lavoie, a veteran marathoner, had been trying to talk Hill into attempting the distance. He had always resisted.

"She's done many marathons," Hill said. "She's done Boston three times. I said, 'Hey, you're going to have to train me, or you're going to have to be my coach."

Lavoie advised Hill that he was in big trouble, but he bought new running shoes and hit the road. On the Sunday after the tragic events in Boston, he completed an 18-miler, his longest run ever. He was on his way.

"(I) did OK," Hill said. "I was like, 'You know, I might be able to do this."

In his position at US-ARIEM, Hill studies heat stroke and musculoskeletal injuries, so he understands

the inherent risks in running a marathon without establishing a base and tapering off his mileage beforehand.

"I will say that I respect the risk of the injuries, and I certainly will hydrate and rest up," said Hill, "and I'm not being reckless about this, other than the fact that I signed up two weeks before the marathon without any true training."

Despite a little soreness, Hill soldiers on as the marathon approaches.

"I feel like I'm fortunate enough to be able to do this race, so I'm just going to do it," Hill said. "I'm going to try to do well. I'm not going to just do an 'airborne shuffle' for 26 miles. I plan to run at a decent clip."

No one has to tell Hill that the Providence race is a qualifier for the 2014 Boston Marathon.

"Without a doubt, if I qualify, I will be running the Boston Marathon — absolutely. After the events of this last marathon, there's no way in the world I'd miss it," said Hill, who grew up in Houston. "I love Boston, and I love the people of Massachusetts and New England. I really respect their passion for these types of events."

His first step toward Boston comes May 12, in Providence, but Hill won't be thinking about himself.

"This is not about me," Hill said. "It's my own quiet little tribute to everybody. Anybody who was directly affected (in Boston), they would do anything to have that opportunity to run. So every time I

even start to feel like this is a task too big, I just think about those individuals and I need to keep going, because they

"Without a doubt, if I qualify, I will be running the Boston Marathon — absolutely. After the events of this last marathon, there's no way in the world I'd miss it. I love Boston, and I love the people of Massachusetts and New England. I really respect their passion for these types of events."

Major Owen Hill, USARIEM

Natick Soldier makes impressive marathon debut in tribute to Boston victims

Start Start

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.



"During the run, I certainly reflected on all of the individuals directly affected by the Boston Marathon bombings, which added to the magnitude of the moment."

unning as a tribute to those affected by the Boston Marathon bombing, Maj. Owen Hill made a memorable marathon debut of his own on Mother's Day.

Hill, deputy chief of the Military Performance Division, U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center, ran the 2013 Cox Sports Marathon in Providence, R.I., in an impressive 3 hours, 34 minutes, 34 seconds.

"I think I ran it well," said Hill, adding that he maintained a pace of 8 minutes, 11 seconds per mile, "and never walked once. Not too shabby for a rookie."

Hill, 43, ran his first marathon with just two weeks of training as a way to honor those killed, injured and otherwise affected by the attack in Boston. He missed his goal of qualifying for the 2014 Boston Marathon by a mere 19 minutes.

Hill said he won't stop trying to meet the qualifying standard of 3:15 for the 40-44 age group.

"I will continue to train, and I plan to run another marathon again before September in an attempt to qualify for the 2014 Boston Marathon," Hill said. "If I cannot qualify for the next Boston marathon, I will certainly work toward 2015."

Hill ran the first half in 1:41:07 on the way to placing 45th among men in the

40-49 age category and 171st among 650 men overall.

"I felt quite strong on the front half and had finished the halfway point right at my desired pace and time," said Hill, who had projected 1:40. "Unfortunately, on the back half of the marathon, my calves began to cramp and that made me adjust my stride, which in turn slowed my pace somewhat. I had to mentally push through miles 19-22."

At mile 23, Hill encountered girlfriend Jesse-Lee Lavoie, a three-time veteran of the Boston Marathon who was there as a spectator to provide a lift to him.

"She gave me a quick round of motivating encouragement, and that was all I needed," Hill said. "I felt galvanized at that point and finished my last 3.2 miles as strong and as fast as I began."

Hill won't soon forget the day, which he had dedicated to bombing victims who could no longer run for themselves.

"Before the race I was excited, cautiously confident, and somewhat tacit as I had my game face on and as we paid tribute to Boston Marathon bombing victims with a moment of silence," Hill recalled. "Overall, it was a profoundly memorable event and a significant achievement. During the run, I certainly reflected on all of the individuals directly affected by the Boston Marathon bombings, which added to the magnitude of the moment."

On a late June day at Fenway Park in Boston, Master Sgt. Miguel Chacon was looking on with great pleasure as Red Sox players signed autographs for his three children and dozens of others when he felt something hit him on the side.

Chacon, in uniform, looked down to see a pair of batting gloves, which he assumed that some fan had tossed down to be signed. A moment later, an usher tapped Chacon on the shoulder and told him that it was Red Sox outfielder Jonny Gomes, known for his unwavering support of the U.S. military, who had thrown them over.

Later, he was able to thank Gomes personally for the unsolicited gesture, but Chacon wanted to do more.

So when Lee Cummings, who works at the U.S. Army Research Institute of Environmental Medicine at Natick Soldier Systems Center, offered him tickets to the Sept. 15 Red Sox-Yankees game at Fenway, Chacon, the USARIEM senior enlisted advisor, brought along the Advanced Combat Helmet that he had worn in Iraq and a bag of "re-

SARIEM Media

corted Chacon and fellow USARIEM Soldier Spc. Travis Crook below the stands and to a door outside the Red Sox clubhouse.

"About three minutes later, here comes Jonny Gomes through the door!" Chacon said. "I reached into the bag and I said, 'This is the helmet that I had in combat."

Chacon told Gomes that he wanted him to have it.

"Are you serious? This is cool. This rocks," Chacon recalled Gomes saying.

"He was just taken by that helmet," Chacon said. "He loved it. He lit up."

As they talked, Gomes pulled down his right sock to reveal a tattoo that stretches from his knee to his ankle. The tattoo includes an American flag, the Statue of Liberty, and a target with the date Osama bin Laden was killed.

"I've met some players," said Chacon, "but I've never met a player as patriotic as Jonny. Never."

The helmet — with Chacon's rank, roster number, blood type, an American flag and a Special Forces sticker on the outside — has

by the Red Sox, now facing the St. Louis Cardinals in the World Series. Chacon didn't part with it lightly.

"Things that I've taken to combat and back, they have a lot of value to me," said Chacon, who has set aside the gear for his children to one day give to theirs. "This is the stuff that dad went to war with. I wanted to give a piece of the battlefield back to Jonny."

Chacon's helmet couldn't have found a better home than Gomes' locker.

"It's an honor to see him wear that," said Chacon, adding that Gomes, in turn, "honors the military. That's bigger than anything.

"I'm glad it's getting them through the battle that they're battling through right now ... to win the World Series."





Lt. Col. Tim Haley and Deborah Haley move on to Fort Hood, Texas, after notable accomplishments in their work at Natick Soldier Systems Center.

A moveable feas

By Bob Reinert/USAG-Natick Public Affairs / NATICK, Mass.

They grew up on the same block in Seattle, but Lt. Col. Tim Haley and Deborah Haley didn't meet each other until later.

"We moved out of the neighborhood just when she moved in," Haley recalled. "It was kind of an ironic thing."

Over the past 17 years, however, the Haleys have lived in many locations together as Haley moved up through the ranks as an Army officer. Over the past four years, they have made Weston, Mass., their home while they both worked at the Natick Soldier Systems Center.

Haley, a pediatrician, served as clinical director in the Office of Medical Support and Oversight at the U.S. Army Research Institute of Environmental Medicine at NSSC. Deborah was a chef and physical science technician with the Department of Defense Combat Feeding Directorate at Natick Soldier Research, Development and Engineering

On July 17, they packed up their things and drove south to Fort Hood, Texas, where Haley will take over as division surgeon with First Army Division West.

"This is the most difficult separation that I've had," Haley said.

"It's hard to leave here," said Deborah of Natick. "To find a workplace that allows you to grow and challenge yourself is great."

The Haleys had significant accomplishments while at Natick. Tim developed a sensor to detect blast wave overpressure that needs no power source.

"It will capture the energy of the blast wave itself to generate the energy (for) the sensor," Haley said. "That's moving forward."

Haley also worked on a lavage mixture for treatment of acute lung injury.

Both ideas earned patents for the Army.

"I didn't have the expertise to advance them," said Haley, "and I found people (at Natick) who were very capable and enthusiastic about it."

Meanwhile, across the installation at Combat Feeding, Deborah was putting her culinary background to work.

"I got hired as a physical science technician to help with all the different ration platforms -the group rations and the individual rations,"

Deborah said. "They were great about bringing me in and giving me a lot of exposure to rations and how the testing process works."

Eventually, Deborah became a key part of Combat Feeding's tube food program for U-2 reconnaissance aircraft pilots.

"I never imagined that I'd be doing that at all, but I loved the challenge, and that's what excites me is the challenge," Deborah said. "How can you take something that's so recognizable and turn it into delicious mush?"

Married for 25 years now, the couple applied their shared love of food to volunteer work with the Wayland-Weston Crew, for whom the youngest of their three daughters rowed.

"The new coach really wanted to emphasize sports nutrition," Haley said. "We sort of developed menus for the kids. I think it was a contributor (to the fact) that we had four boats that went to nationals, and one of the boats in which my daughter rowed came in second."

Wherever they go, Deborah will continue her tradition of making custom meals for family members on their birthdays.

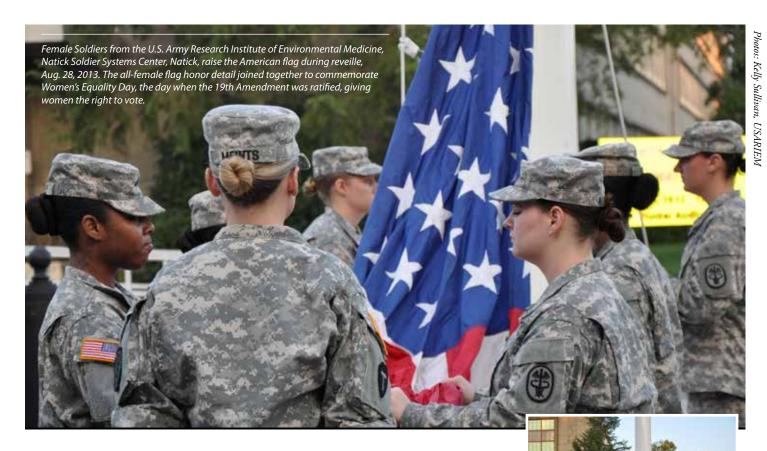
"I usually will have it a split plate," said Haley, who favors salmon in mango butter sauce aside rack of lamb. "It's really nice."

The tradition has probably made all the moving around -- along with deployments to Iraq and Afghanistan -- easier to digest for Haley, who knows he has always had other options in the civilian world.

"I stay in because I really love the Army," Haley said. "I just love serving."

Deborah said she has enjoyed serving as a civilian.

"It's been great for me, because I've gotten to go out in the field, and I have a much better idea of what ... Tim experiences," Deborah said. "That's been eye-opening and exciting. I think it increases the bond of understanding."



Female flag detail honors Women's Equality Day

By Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.

Every day at 6:30 a.m. sharp, Soldiers stationed at Natick Soldier Systems Center raise the American flag over the installation during a ceremony called reveille. On Aug. 28, however, as the sun rose something special happened, making this daily routine memorable.

"An all-female flag honors team raised the installation flag during reveille," said Spc. Marissa Spitz, a biological research assistant with the U.S. Army Research Institute of Environmental Medicine, who took part in the detail. "I am excited to be a part of this to give tribute to female warfighters who served before me and have paved the way for me to be where I am today."

Spitz said the seven female Soldiers were there to commemorate Natick Soldier Systems

Center's Women's Equality Day, and to celebrate the privilege of serving their country.

Women's Equality Day, celebrated nationally Aug. 26, observes the ratification of the 19th Amendment, which gave women the right to vote. This year marked its 93rd anniversary.

In a presidential proclamation, President Obama noted that after decades of organizing, agitating and demonstrating, this country achieved a major victory for women's rights and American democracy. The 19th Amendment was certified, extending the vote to women and advancing our nation's long journey toward full equality for all Americans.

The ratification of the 19th Amendment paved the way for more women to participate in American politics — as leaders, candidates, voters and volunteers.



Natick Soldier Systems Center planned other events to mark the day, including a speech about the women's rights movement and various Family and Morale, Welfare and Recreation events. For Soldiers like Spitz, it is important to honor such historic events to appreciate the benefits from them that are felt by many today.

"It's important to look back into our nation's great history of women who have given tremendous amounts of time and effort to pave the way for equal opportunity now," said Spitz, "especially in the military."







Natick holds inaugural NCO **Induction Ceremony**

By Bob Reinert, USAG-Natick Public Affairs / NATICK, Mass.

Followers became leaders as six noncommissioned officers were recognized Sept. 30 at U.S. Army Garrison Natick's inaugural NCO Induction Ceremony.

Command Sgt. Maj. Kevin B. Stuart of the U.S. Army Medical Research and Materiel Command served as guest speaker at the ceremony, held at the Lord Community Center. Inductees included Sgt. David A. Gonzalez, Sgt. Matthew C. Lavallee, Sgt. Crystal L. Meints, Staff Sgt. Shaun M. Morand, Sgt. Dennis E. Scofield, and Sgt. Marissa G. Spitz.

"We had the opportunity to be included in this time-honored custom, which many Soldiers may never get to witness and be a part of," Spitz said. "I was happy to see so many folks from around (Natick Soldier Systems Center) at the event, to witness this important day for us Soldiers. We appreciate all of the hard work they do in their research for the Soldiers, and we try to give as much back as we can by being superior leaders and warfighters."

Natick Command Sgt. Maj. Robert Beau-

soleil reminded those in attendance of the event's importance.

"This induction ceremony that you just witnessed is a time-honored custom of select Soldiers being inducted into the ... corps of the noncommissioned officers," Beausoleil

In his remarks, Stuart welcomed the Natick Soldiers to the NCO Corps.

"You are now part of the NCO heritage," Stuart told the inductees. "You now have the opportunity to contribute to the legacy of outstanding service and leadership. You now have the opportunity to be part of a team that has been around for about 238 years. You now have the opportunity to be a part of a corps that has been in every battle, every skirmish, every war from the Revolutionary War to present."

Stuart pointed out that today's NCOs must train, teach, coach and mentor Soldiers to success while working under a great deal of scrutiny.

"You see, in a sense, we live in a glass house,"

Staff Sqt. Shaun M. Morand, Left, passes through an arch and under crossed swords, and Command Sgt. Maj Kevin B. Stuart, right, speaks to inductees Sept. 30 during the inaugural NCO Induction Ceremony at Natick.

Stuart said. "People are always watching us. They need that leadership. They want that leadership."

Stuart told the NCOs that leading Soldiers won't always be easy.

"You've got to make tough decisions sometimes. You're going to face tough situations and circumstances."

Leadership isn't just about rank, positions and functions, Stuart said. He added that it's about relationship, friendship, fellowship, partnership, sportsmanship, sponsorship and mentorship.

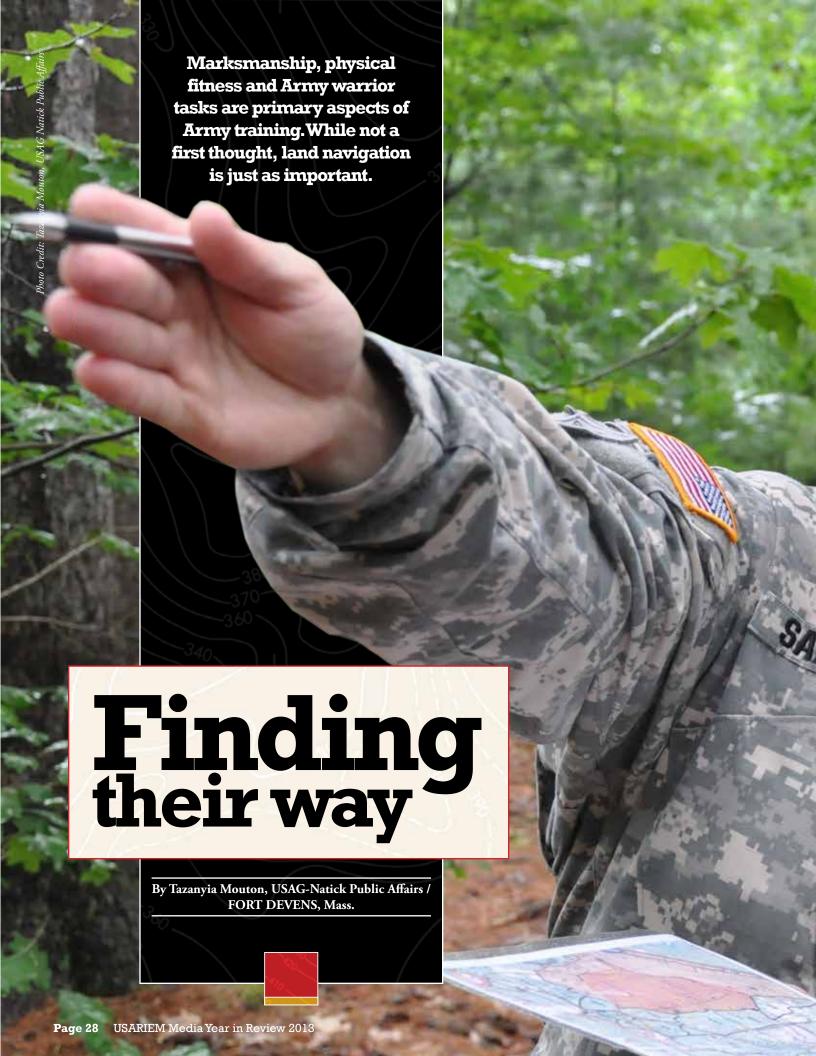
"We have to be the best at what we do. We lead by example. Always strive for excellence."

During the ceremony, the NCOs passed under an arch and crossed swords, symbolizing their transition from followers to leaders.

"Once you cross that line, there's no crossing back," Stuart said. "More than ever, our noncommissioned officers are needed in our Army."

Spitz said she was impressed with what Stuart had to say to her and her fellow inductees.

"CSM Stuart ... gave a very inspiring speech on the Army values and leadership," said Spitz, "tools I will definitely use on a daily basis."





With this in mind, the Soldiers and officers of the U.S. Army Research Institute of Environmental Medicine, or USARIEM, went to the woods of Fort Devens to brush up on their skills July 26.



Prior to heading to the field, Soldiers clocked in some classroom hours to prepare for the adventure. Soldiers looked at the tools they would be using to familiarize themselves with the fundamentals of land navigation.

After arriving in the field, a quick briefing was given to personnel, stressing the importance of the correct way to hold the compass, how to establish a pace count, and plotting points on their maps using an azimuth, or degrees.

"So, basically, what we're doing is we're handing out maps of the general area, giving them three to four eight-digit grid coordinates; they plot those coordinates on the map, and they go and they find them," said Staff Sgt. Carl Larcom, Military Performance Division non-commissioned officer in charge at USARIEM.

> Larcom spearheaded this particular training,

along with Capt. Laurel Smith, a research occupational therapist with USARIEM.

"It's just good refresher training, and it gives the unit a chance to mingle with people that they might not have an opportunity to work with outside their division," said Smith. "It promotes esprit de corps and morale, and gets us out of the office."

Once a week, the Soldiers of USARIEM partake in some type of training. This usually consists of classroom-style instruction covering everything from Equal Opportunity to Sexual Harassment/Assault Response and Prevention (SHARP) to life-preservation training. USARIEM leaders also try to incorporate field exercises at least once a month.

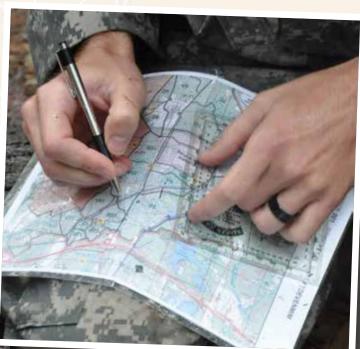
"(This training) is nice because it breaks up the day and gives some of the Soldiers an opportunity to get out and apply some of their military skills and knowledge," said Smith.

This type of out-of-the-office training also prepares Soldiers for potential future assignments.

"It's all very precise in order to get you there," said Larcom. "That eight-digit grid should get you within 10 meters of your point ... (With) a 10-digit grid, you should be within one meter."

Larcom also pointed out that it is often difficult for some Soldiers to realize the attention to detail it takes during an exercise such as this one.





Photos: Tazanyia Mouton, USAG Natick Public Affairs

"They have to be really accurate," Larcom said, or the Soldiers run the risk of not finding their points.

As the first iteration came to an end, Soldiers had plenty to say about the course.

"Everything went really well, especially considering the weather. Everybody's in pretty high spirits," said Sgt. Shaun Morand, a behavioral health NCO at USARIEM.

Soggy conditions called for a slightly trickier land navigation day as Soldiers had to be certain they weren't stepping into unstable terrain.

Morand, considered an expert in land navigation, made sure not to dominate his group.

"I kind of let them take the reins, made a couple of corrections when I realized we needed to, and used it as a learning point," said Morand. "If you have people looking over things twice, you're more than likely to get it right."

Morand also said the land navigation course had "real-world application" that could be used whether someone is downrange or hiking on his or her own.

Cpl. Luis Leandry, a bioscience research assistant at USARIEM, trekked through the moist woods to complete the course.

"Two of the points were in the middle of the swamp ..., which threw us off," Leandry said with a chuckle.

"The first one was really hard to find, then the second was OK, and the third one was in a swamp again, so that was a little bit rough."

Course facilitators purposely designated points in areas such as these so Soldiers could then practice their skills involving getting a back-azimuth. Instead of getting a direct "hit," Soldiers could backtrack to figure out where their next point would be.

Smith thought the exercise overall went really well.

"No one got hurt and everyone had fun," said Smith. "I think (everyone) learned something, and it seems like most had a good time despite the weather, which is always a positive."

USARIEM has more training on the horizon, including a leader's reaction course, grenade launcher and rifle ranges.



For the third year in a row, the Gains in the Education of Mathematics and Science, an extracurricular summer science education program, which enables students to experience science in a real laboratory setting, was hosted at USARIEM.

"Our main objective was to take science and math out of the classroom and put it in a real-world setting," Capt. Carrie Quinn, a research physiologist for USARIEM's Thermal and Mountain Medicine, said. "The kids got to see things here that they wouldn't be able to experience anywhere else. They get to truly see how science and math are everywhere — even in the Army."

Quinn, program manager for USARIEM GEMS program, said her main goal this year was to create a sense of community while getting students excited about math and science.

"The students were very excited to participate at all levels this year. We were able to add GEMS III to the program, and it has been a huge success," Quinn said. "This is also a wonderful opportunity to showcase the work that is done at Natick Soldier Systems Center to the general community."

The GEMS program at USARIEM began during summer 2011 with 100 students enrolled in four GEMS I programs.

This summer, the program has doubled to three GEMS I sessions, two intermediate, or GEMS II programs and one GEMS III session with 195 students over six weeks.

The program is based on a multidisciplinary educational curriculum, and is focused on age- and grade-appropriate hands-on activities, in areas such as science, engineering, mathematics, computational sciences, computational biology, biomedical sciences, chemistry and biology.

While exploring the GEMS I program, student interns investigate problem solving, estimation, water properties, physics/forces of motion,

and forensics. Students received a stipend to participate in these fourday programs.

Advanced high school and collegeaged students called near-peer mentors lead the GEMS programs and serve as role models for the students. near-peer mentors completed extensive training in which they learned how to conduct and teach the GEMS experiments at a science boot camp prior to the student interns' arrival.

The near-peers were also charged with coming up with the curriculum for the GEMS II and III programs. GEMS II features a brain lab, a microbiology tour, flame lab and robotics, while GEMS III boasts lessons in physics, electrolysis and building a custom fuel car.

Jack Gagner, 14, a student intern who will be in the ninth grade in the fall, has participated in all three years of GEMS. Gagner said this program has really kept his interest in math and science.

"I was really happy to come back this year," Gagner said. "In school we learn, but we do not get to be hands on. GEMS really allows us to explore and test what we are learning and I really like that."

Gagner said his favorite part about the program is the counselors or near-peer mentors. He is hoping to come back as a near-peer in future summers and may one day become a biologist.

"The mentors have been so great, nice and encouraging to us," Gagner said. "I would definitely like to stay involved in this program and be a mentor for others."

Daniel Eggers, a teacher at Weymouth High School who has been

the resource teacher for the GEMS program for three years in a row, agrees that it is the near-peer mentors that make the program exceptional.

"The near-peer mentors have been phenomenal," Eggers said. "Each day, it is their responsibility to make sure the program goes smoothly from start to finish; from leading experiments to doing administrative tasks to taking on a leadership role in the classes, each mentor has contributed to the program's success based on their personal strengths."

In 2005 a bipartisan panel composed of the House of Representatives and Senate asked the National Academies of Science and Medicine what could be done to strengthen America's position in the global economy in the areas of mathematics and sciences. This panel was concerned that our future work force would be losing jobs in the areas of science and technology.

The answer from the National Academies of Science and Medicine was that there needed to be summer internships for middle and high school students aimed at engaging them in mathematics and science.

The Army created the GEMS program as part of this realization that science and mathematics is important to instill in the younger generations for future prosperity. According to the Army, it has a long history of recognizing that a scientifically and technologically literate citizenry is this country's best hope for a secure, rewarding and successful future.

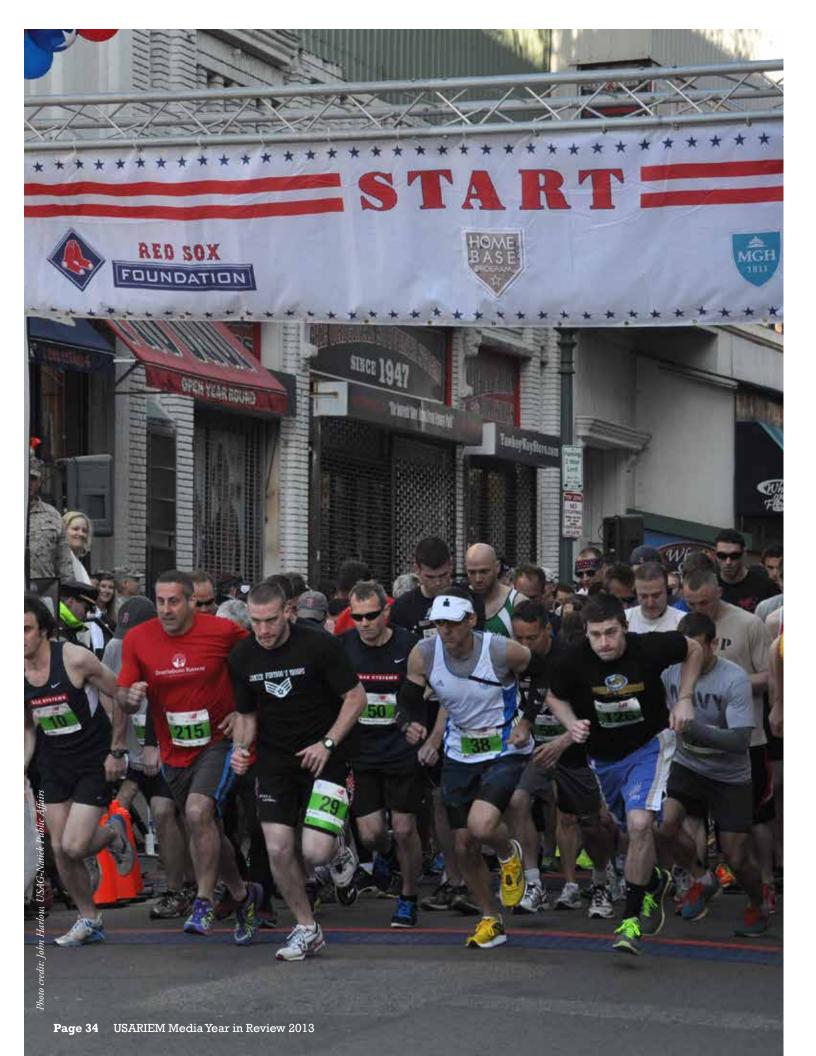
The GEMS program began as a single program at Walter Reed in 2005 and has expanded to 12 programs across the major Army research installations, including the one at USARIEM.



Igniting interest

GEMS summer program inspires kids in math and science

By Ms. Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.



Heading for Home

By Tazanyia Mouton, USAG-Natick Public Affairs / BOSTON, Mass.

More than 2,000 people, including hundreds of current service members, gathered May 4 at Fenway Park for the annual "Run-Walk to Home Base" to help those with the "invisible wounds of war."

In fall 2009, the Red Sox Foundation, in partnership with Massachusetts General Hospital, established the Home Base Program to help improve the lives of Iraq and Afghanistan veterans and their families affected by post-traumatic stress disorder and traumatic brain injury. Through the Home Base Program, veterans and family members have access to clinical care, the community as a whole can become educated about the challenges military families face on a daily basis, and research is conducted to improve understanding and treatment of PTSD and TBI.

Sgt. 1st Class Adam Morelli, detachment sergeant, U.S. Army Research Institute of Environmental Medicine, is one of those war veterans. While deployed with a military transition team, Morelli and about 10 other Soldiers were tasked with training more than 750 Iraqi soldiers on how to be medics.

"Throughout the course of the time after many IEDs and (rocket-propelled grenades) had hit right around us, I realized I started getting headaches, and I still deal with headaches about three to five times a week." Morelli said.

Morelli could have either checked out or stayed in the fight. His decision was an easy one.

"So, for me, it was more of ... I'm going to take care of my team members," said Morelli, "because if I'm out of the fight, then I can't take care of those members."

Through programs such as Home Base, Morelli is able to take part in speech therapy and memory exercises.

"Once a month, actually, I have to just get my medicine changed to try to beat these headaches because that's the biggest thing for me, because four years later, I'm still dealing with some headaches," he said.

"This year's run was even more meaningful in the wake of last month's Boston Marathon and the senseless violence that followed," said Red Sox Chairman Tom Werner. "Our service men and women sacrifice so much so we can be safe at home. Sadly, the traumas they experience are not the same ones affecting many of those who were injured during the marathon bombings. It only heightens the urgency for the ground-breaking research that brilliant physicians and researchers are working on right now at Mass General.

Many participants didn't want those activities to make them hesitate or falter. Morelli found himself motivated after the incident.

"I was even more determined, actually," Morelli said. "My wife was definitely concerned and wanted me not to participate, but it was even more so to come up and make a stand and say ... I'm not going let terrorism stop us from anything. We're going to continue to do everything as we planned to do."

Service members from all branches came out in high numbers to support the event. Spc. Marissa Spitz, a biological research assistant for USARIEM, found out about the program and wanted to show her support.

"I thought it was a great event," Spitz said.
"It's in a great location for a great cause —
running for Soldiers who have PTSD, TBI
and helping contribute to the research that
they're doing. That's the future of the Army
and all the branches."

Running for the second time, Spitz has no doubt that as long as she's in the area, she will participate in other runs.

"It's exciting to be around so many other people who are coming together for the same thing," said Spitz, "for warfighters who have gone through whatever they've gone through and are living with PTSD or TBI."

Col. Deborah Whitmer, USARIEM commander, couldn't have been more proud of her troops.

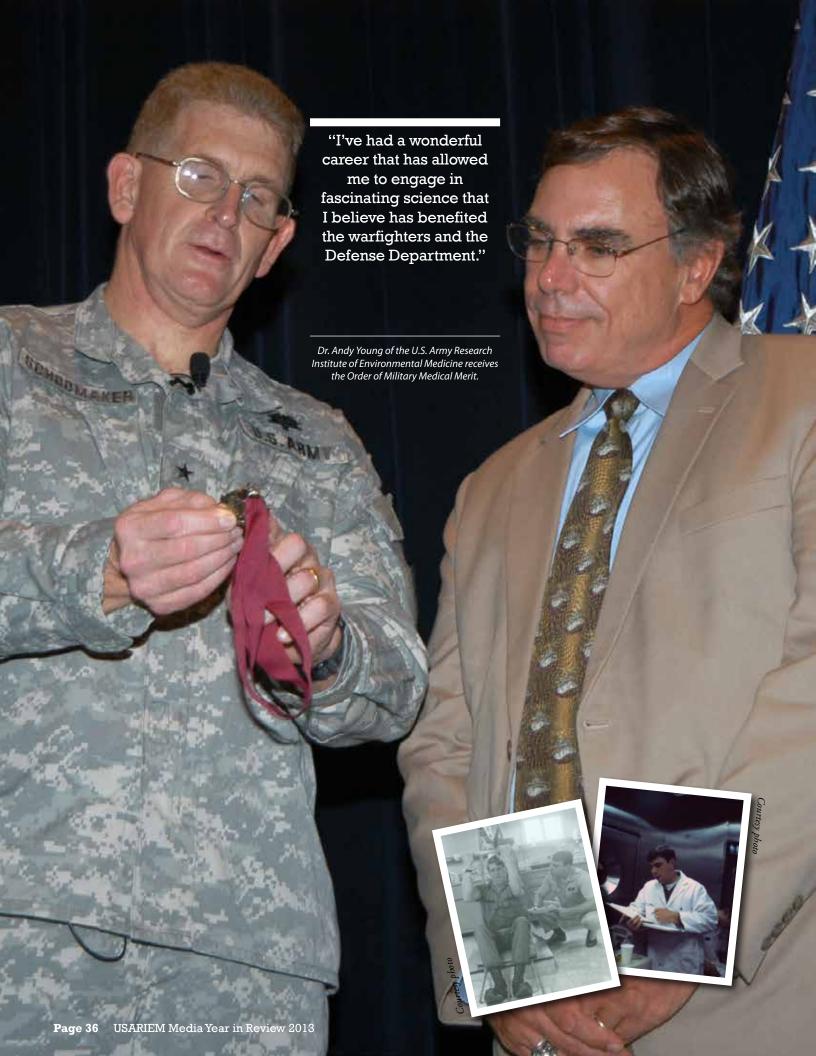
"It was extremely rewarding and gratifying to see them out here contributing to this cause," Whitmer said. "In the Army we have the value of selfless service, and that's what all my Soldiers are striving for and demonstrating to those around them every day. So bravery to step up there and disclose those sorts of things is inspiring."

Whitmer would like to see a close partnership between USARIEM and the Home Base Program in the future. "I want to get them to visit our unit and (Natick Soldier Systems Center), as well," she said.

Gen. John F. Kelly, commander, U.S. Southern Command, had this to say about the event: "It's something special, it really is, to see the outpouring of Boston and the surrounding area and the warriors and their support. It's just an incredible feeling, nothing like it."

Spc. Kyle Bibens, USARIEM, finished 30th in the race overall. Capt. Melissa Riddle, USARIEM, finished second among the women running the race.

Over the past four years, the Run-Walk to Home Base has raised more than \$9 million to assist more than 500 Iraq and Afghanistan veterans and families, as well as to educate more than 6,000 clinicians throughout the U.S.



Army researcher retires after 36 years of services

By Kelly Sullivan, USARIEM Public Affairs / NATICK, Mass.

It's been 36 years since Dr. Andrew Young first stepped foot through the U.S. Army Research Institute of Environmental Medicine's doors as a young captain, and after a lifetime of contributions to the Army science, Young is preparing to say goodbye.

"I've worked here for so long and have so many fond memories, it is difficult to pick any single one," Young said. "However, I think the memories of the many different field studies on which I worked are among the best memories."

Young began his Army career as a captain and research physiologist within the Altitude Research Division at USARIEM in 1977. His preliminary research was in the area of high-altitude physiology and exercise metabolism. Four years later, he left USARIEM for the Department of Physiology at Walter Reed Army Institute of Research.

He returned to USARIEM in 1983, this time as a civilian research physiologist for the Military Ergonomics Division. In 1990, Young made the transition to the Thermal and Mountain Division, where he began investigating physical performance limitations of humans exposed to thermal stress.

"My personal favorite study was probably the study we conducted with Soldiers from the Ranger Training Brigade at Camp Rudder, Florida," Young said. "The research team performed well in pretty stressful conditions, our volunteer subjects were amazingly cooperative, and the findings of the research, along with other work we did for the Ranger Training Brigade at the same time, enabled the revision of safety tables used to regulate training activities in the swamp based on water depth and temperature. I think those findings may have enhanced health protection for the students at the RTB."

In 2000, Young became the division chief of the Military Nutrition Division. In this

role, Young has supervised the work of, and has been an invaluable mentor to, scientists, Soldiers, technicians and support staff. With Young's leadership and guidance over the past 13 years, the Nutrition Division has seen significant growth, attained important partnerships and has accomplished many great endeavors. He hopes that his legacy will lead to further partnerships.

"I hope that by my example, USARIEM scientists and staff appreciate the value of working collaboratively, crossing organizational lines to leverage the talents and skills of colleagues so as to maximize the outcomes of our research projects," Young said. "I also hope that the scientists will continue to take great care with their written and oral communications, and if nobody ever used the word 'utilize' rather than the simpler word 'use,' then I'd consider myself a successful editor."

As a researcher, Young has made overwhelmingly significant contributions to the fields of exercise science and nutrition. He has been the editor-in-chief of the American College of Sports Medicine's flagship research journal, Medicine and Science in Sports and Exercise, for almost a decade. Young has also authored or co-authored more than 140 open-literature research articles, 30 book chapters and 25 government technical reports. His work has been cited more than 2,000 times.

He has been awarded the Army Commendation Medal with Oak Leaf Cluster, the Department of the Army Superior Civilian Service Medal, the Department of the Army Commander's Award for Civilian Service, the Department of the Army Achievement Medal for Civilian Service, the Expert Field Medical Badge, and the Army Medical Department's Order of Military Medical Merit.

Last year, Young was presented with the ACSM Citation Award, which is granted only to those who have made the most significant and important contributions to sports medicine and the exercise sciences. Young said that it was through support that he was able to make such accomplishments.

"Over my entire career, I've never gotten anything done on my own," Young said. "I need to thank the many creative and dedicated scientists with whom I've collaborated ... and the entire Military Nutrition Division team deserves my thanks for the simply outstanding support they've given me and the directions that I've tried to steer our work. Also, thank you to my long-standing scientific collaborators, mentors and friends, who advanced my career and added to my life in ways I cannot ever repay."

His advice to researchers is to not focus on research simply to see "what happens."

"Then your findings will only be applicable to the specific conditions you studied," Young said. "Instead, design your research to investigate 'how and why it happens,' so that you can extrapolate the results to predict outcomes in many other conditions, populations and situations. That will increase the value of your efforts."

Young's immediate plans are to re-energize and rewrite his life's mission statement. He plans to explore new opportunities to serve, perhaps in local community volunteer work, and also to sell his home so he and his wife Pat can relocate to a more urban environment.

"I've had a wonderful career that has allowed me to engage in fascinating science that I believe has benefited the warfighters and the Defense Department," Young said. "I've gotten to work with outstanding people and travel extensively, and I wouldn't do anything differently. I've focused almost my entire energy on this career. Now, I'm looking forward to figuring out something new and different to do with my life that can be equally meaningful, memorable and fun."



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